APPENDIX C. Arizona's Surface and Ground Water Quality Standards

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment) Standards revisions adopted in 2002 shown as ***bold and italics.***				
PARAMETER		**DESIGNATED USE(S)**	**STANDARD OR ASSESSMENT CRITERIA**	**CHRONIC STANDARDS New methods to assess chronic standard violations**
Ammonia (NH3)		A&Wc/A&Ww	Standard varies by pH., see table in standards.	***New standard, varies by temperature and pH***
Antimony (Sb)	dissolved	A&Wc/A&Ww A&Wedw	88 µg/L 1,000 µg/L	30 µg/L 600 µg/L
	total	DWS FBC/PBC FC	6 µg/L ***560 µg/L*** ***4,300 µg/L***	NA
Arsenic (As)	dissolved	A&Wc/A&Ww/A&Wedw A&We	360 µg/L 440 µg/L	190 µg/L 230 µg/L
	total	DWS/FBC AGL PBC FC AGI People's Canyon Creek (Unique Waters)	50 µg/L 200 µg/L ***420 µg/L*** 1450 µg/L 2,000 µg/L 20 µg/L	NA
Barium (Ba)	dissolved	FBC/PBC	***98,000 µg/L***	NA
	total	DWS	2,000 µg/L	
Beryllium (Be)	dissolved	A&Wc/A&Ww/A&Wedw	65 µg/L	5.3 µg/L
	total	DWS FC PBC/FBC	4 µg/L ***1,130 µg/L*** ***2,800 µg/L***	NA NA NA
Boron (B)	total	DWS AGI FBC/PBC	630 µg/L 1,000 µg/L ***126,000 µg/L***	NA
Cadmium (Cd)	dissolved	A&W	***Standard varies by water hardness*, see published standards.***	***Standard varies by hardness*, see published standards.***
	total	DWS FC AgI/AgL FBC/PBC	5 µg/L ***84 µg/L*** 50 µg/L ***700 µg/L***	NA
Chlorine (total residual) (Cl)		A&Wc/A&Ww/A&Wedw DWS FBC/PBC	11 ug/L ***700 µg/L*** ***140,000 µg/L***	5 ug/L

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment)
Standards revisions adopted in 2002 shown as *bold and italics.*

PARAMETER		DESIGNATED USE(S)	STANDARD OR ASSESSMENT CRITERIA	CHRONIC STANDARDS New methods to assess chronic standard violations
Chromium (Cr)	dissolved	Unique Waters standards for: West Fork Little Colorado River, above Government Springs Oak Creek and West Fork Oak Creek	 10 µg/L 5 µg/L	
	total	DWS/FBC/PBC AgI/AgL	***100 µg/L*** 1,000 µg/L	NA
Chromium III (Cr III)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	***Standard varies by water hardness*, see published standards.***	***Standard varies by hardness*, see published standards.***
	total	DWS FC FBC/PBC	***10,500 µg/L*** ***1,010,000 µg/L*** ***2,100,000 µg/L***	NA
Chromium VI (Cr VI)	dissolved	A&Wc/A&Ww/A&Wedw/ A&We	16 µg/L 34 µg/L	11 µg/L 23 µg/L
	total	DWS FC FBC/PBC	***21*** ***2,000 µg/L*** ***4,200 µg/L***	NA
Copper (Cu)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	***Standard varies by water hardness*, see published standards.***	***Standard varies by hardness*, see published standards.***
		Rio de Flag below WWTP outfall	***36 µg/L***	
	total	AgL DWS/FBC/PBC AgI	500 µg/L ***1,300 µg/L*** 5,000 µg/L	NA
Cyanide (Cn)	total	A&Wc A&Ww/A&Wedw A&We AgL, DWS FBC/PBC FC	22 µg/L 41 µg/L 84 µg/L 200 µg/L ***28,000 µg/L*** ***215,000 µg/L***	5.2 µg/L 9.7 µg/L 19 µg/L
Dissolved Oxygen (DO)		A&Ww A&Wc A&Wedw	>6.0 mg/L >7.0 mg/L Applies 3 hours after sunrise to sunset >3.0 mg/L Applies sunset to 3 hours after sunrise >1.0 mg/L note: in compliance if % saturation is = or > 90%	
		West Fork Little Colorado (Unique Waters) Peoples Canyon Creek (Unique Waters) Cienega Creek (Unique Waters) Bonita Creek (Unique Waters)	no decrease due to discharge	
DDE (metabolite of DDT) p,p'-Dichlorodiphenyldichloroethylene		AgI, AgL, FC DWS A&Wc A&Ww, A&Wedw A&We FBC/PBC	0.001 0.1 1.1 µg/L 1.1 ug/L 1.1 ug/L 4.1	-- -- 0.001 0.02 -- --

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment)
Standards revisions adopted in 2002 shown as *bold and italics.*

PARAMETER		DESIGNATED USE(S)	STANDARD OR ASSESSMENT CRITERIA	CHRONIC STANDARDS New methods to assess chronic standard violations
Escherichia coli		FBC PBC	***geometric mean (4 sample minimum) = 126 CFU/100ml*** ***single sample maximum = 235 CFU/100ml*** ***geometric mean (4 sample minimum) = 126 CFU/100ml*** ***single sample maximum = 576 CFU/100ml***	
Fluoride (F)		DWS FBC/PBC	4,000 µg/L(4 mg/L) ***84,000 µg/L(84 mg/L)***	NA
Lead (Pb)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	***Standard varies by water hardness*, see published standards.***	***Standard varies by hardness*, see published standards.***
	total	DWS/ FBC/PBC AgL AgI	***15 µg/L*** 100 µg/L 10,000 µg/L	NA
Manganese (Mn)		DWS AgI FBC/PBC Unique Waters standards for: People's Canyon Creek, Burro Creek, and Francis Creek	***980 µg/L*** 10,000 µg/L ***196,000 µg/L*** 500 µg/L	NA
Mercury (Hg)	dissolved	A&Wc/A&Ww A&Wedw A&We	2.4 µg/L 2.6 µg/L 5.0 µg/L	0.01 µg/L 0.2 µg/L 2.7 µg/L
	total	FC DWS AgL FBC/PBC	0.6 µg/L 2 µg/L 10 µg/L ***420 µg/L***	NA
Nickel (Ni)	dissolved	A&W	***Standard varies by water hardness*, see published standards.***	***Standard varies by hardness*, see published standards.***
	total	DWS FC FBC/PBC	***140 µg/L*** ***4,600 µg/L*** ***28,000 µg/L***	
Nitrate (as nitrogen) (NO3)		DWS mean value San Pedro (Curtiss-Benson) FBC/PBC	10,000 µg/L (10 mg/L) 10,000 µg/L (10 mg/L) ***2,240,000 µg/L (2,240 mg/L)***	NA
Nitrate/Nitrite (as nitrogen) (NO3/NO2)		DWS	10,000 µg/L (10 mg/L)	
Nitrite (as nitrogen) (NO2)		DWS FBC/PBC	1,000 µg/L (1 mg/L) ***140,000 µg/L (140 mg/L)***	NA
Nitrogen (N)	total	See nutrient chart below		
pH		A&W/FBC/PBC/AgL DWS AgI All waters except Unique Waters Unique Water standards for: Bonita Creek, Cienega Creek, West Fork Little Colorado, Oak Creek, and West Fork Oak Creek	6.5 - 9.0 5.0 - 9.0 4.5 - 9.0 Maximum change due to discharge = 0.5 No change due to discharge	
Phosphorus (P)	total	See nutrient chart below		

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment)
Standards revisions adopted in 2002 shown as *bold and italics.*

PARAMETER		DESIGNATED USE(S)	STANDARD OR ASSESSMENT CRITERIA	CHRONIC STANDARDS New methods to assess chronic standard violations
Selenium (Se)	total	A&Ww/A&Wc AgL A&We A&Wedw AgL/DWS FBC/PBC FC	20 µg/L 20 µg/L 33 µg/L 50 µg/L 50 µg/L ***7,000 µg/L*** 9,000 µg/L	2 µg/L NA 2 µg/L 2 µg/L NA NA NA
Silver (Ag)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	***Standard varies by water hardness*, see published standards.***	***Standard varies by hardness*, see published standards.***
	total	DWS FBC/PBC FC	***35 µg/L*** ***7,000 µg/L*** ***107,700 µg/L***	NA
Suspended Sediment Concentration		A&Wc, A&Ww	***Geometric mean (4 sample minimum) of samples at or near base flow 80 mg/L***	
Sulfides (S2)		A&W	100 µg/L(0.1 mg/L) ***applies only in upper layer in a lake***	NA
Temperature (maximum increase due to discharge)		A&Wc A&Ww/A&Wedw Unique Water standards for: Bonita Creek, Cienega Creek, West Fork Little Colorado, and People's Canyon	1.0 E C 3.0 E C no increase due to discharge	NA
Thallium (Tl)	dissolved	A&Wc/A&Ww/A&Wedw	700 µg/L	150 µg/L
	total	DWS FC FBC/PBC	2 µg/L ***7.2 µg/L*** ***112 µg/L***	NA
Total Dissolved Solids (TDS)		Colorado River: below Hoover Dam below Parker Dam at Imperial Dam	NA	(flow-weighted average annual) 723 mg/L 747 mg/L 879 mg/L
		Unique Water standards for: West Fork Little Colorado River, Bonita Creek, & Cienega Creek	no increase due to discharge	NA
Turbidity		Oak Creek (Unique Waters)Peoples Canyon Creek (Unique Waters) Cienega Creek (Unique Waters) Bonita Creek (Unique Waters)	3 NTU change due to discharge 5 NTU change due to discharge 10 NTU 15 NTU	NA
		Former standards: A&Wc (lakes and streams) A&Ww (lakes) A&Ww and A&Wedw (streams)	Former standards 10 NTU 25 NTU 50 NTU	
Uranium (Ur)	dissolved	DWS	35 µg/L	NA
Zinc (Zn)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	***Standard varies by water hardness*, see published standards.***	***Standard varies by hardness*, see published standards.***

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment) Standards revisions adopted in 2002 shown as ***bold and italics.***				
PARAMETER		**DESIGNATED USE(S)**	**STANDARD OR ASSESSMENT CRITERIA**	**CHRONIC STANDARDS New methods to assess chronic standard violations**
	total	DWS AgI AgL FC FBC/PBC	2,100 µg/L 10,000 µg/L 25,000 µg/L ***69,000 µg/L*** ***420,000 µg/L***	NA

*Dissolved metal standards are calculated using equations published with the surface water standards (e.g., copper A&Wc acute standard: $e^{(0.9422\ [\ln(\text{hardness})]-1.464)}$. In these equations, hardness (expressed as $CaCO_3$) does not exceed 400 mg/L; therefore, use 400 mg/L hardness if result is greater than 400 mg/L.

SURFACE WATER QUALITY STANDARDS FOR RADIOCHEMICALS		
Radiochemical	**Designated Use**	**Standard (mean value)**
Gross Alpha (excluding radon and uranium)	DWS	15 pCi/L
Radium-226 + Radium-228	DWS	5 pCi/L
Strontium 90	DWS	8 pCi/L
Tritium	DWS	20,000 pCi/L

SURFACE WATER QUALITY NUTRIENT STANDARDS			
WATERSHED OR SITE SPECIFIC LOCATION	**Annual Mean**	**90th Percentile**	**Single Sample Max**
Verde River and tributaries -- above Bartlett Lake	Phosphorus 0.10 mg/L Nitrogen 1.00 mg/L	Phosphorus 0.30 mg/L Nitrogen 1.50 mg/L	Phosphorus 1.00 mg/L Nitrogen 3.00 mg/L
Oak Creek including West Fork (in Verde Watershed) (Unique Waters standard)	Phosphorus 0.10 mg/L Nitrogen 1.00 mg/L	Phosphorus 0.25 mg/L Nitrogen 1.50 mg/L	Phosphorus 0.30 mg/L Nitrogen 2.50 mg/L
Black River, Tonto Creek and their tributaries (in Salt Watershed)	Phosphorus 0.10 mg/L Nitrogen 0.50 mg/L	Phosphorus 0.20 mg/L Nitrogen 1.00 mg/L	Phosphorus 0.80 mg/L Nitrogen 2.00 mg/L
Salt River and tributaries (except Pinal Creek) -- from confluence of Black and White to Roosevelt Lake	Phosphorus 0.12 mg/L Nitrogen 0.60 mg/L	Phosphorus 0.30 mg/L Nitrogen 1.20 mg/L	Phosphorus 1.00 mg/L Nitrogen 2.00 mg/L
Salt River -- below Stewart Mtn. Dam to confluence w/Verde River	Phosphorus 0.05 mg/L Nitrogen 0.60 mg/L	Phosphorus NNS Nitrogen NNS	Phosphorus 0.20 mg/L Nitrogen 3.00 mg/L
Roosevelt, Apache, Canyon, and Saguaro Lakes (composites at 2- and 5-meter depth)	Phosphorus 0.03 mg/L Nitrogen 0.30 mg/L	Phosphorus NNS Nitrogen NNS	Phosphorus 0.60 mg/L Nitrogen 1.00 mg/L (maximum of any set)
Little Colorado River and tributaries -- above River Reservoir. in Greer; So Fork LCR -- above South Fork Campground; and Water Canyon Creek --above USFS boundary	Phosphorus 0.08 mg/L Nitrogen 0.60 mg/L	Phosphorus 0.10 mg/L Nitrogen 0.75 mg/L	Phosphorus 0.75 mg/L Nitrogen 1.10 mg/L
Little Colorado River -- at Apache County Road No 124	Phosphorus NNS Nitrogen NNS	Phosphorus NNS Nitrogen NNS	Phosphorus 0.75 mg/L Nitrogen 1.80 mg/L
Little Colorado River -- from Amity Ditch diversion near AZ Hwy 273 to Lyman Lake (only when < 50 NTU)	Phosphorus 0.20 mg/L Nitrogen 0.70 mg/L	Phosphorus 0.30 mg/L Nitrogen 1.20 mg/L	Phosphorus 0.75 mg/L Nitrogen 1.50 mg/L
Colorado River -- at Mexico/US Northern International Border near Morales Dam	Phosphorus NNS Nitrogen NNS	Phosphorus 0.33 mg/L Nitrogen 2.50 mg/L	Phosphorus NNS Nitrogen NNS
San Pedro River -- from Curtis to Benson.	Phosphorus NNS Nitrogen NNS	Phosphorus NNS Nitrogen NNS	Phosphorus NNS Nitrate (as N) 10 mg/L

Narrative Water Quality Standards

Narrative Surface Water Quality Standards

R18-11-108 -- A surface water shall be free from pollutants in amounts or combinations that:

- C Settle to form bottom deposits that inhibit or prohibit the habitation, growth, or propagation of aquatic life or that impair recreational uses (bottom deposits standard);
- C Cause objectionable odor in the area in which the surface water is located;
- • Cause off-taste or odor in drinking water;
- • Cause off-flavor in aquatic organisms or waterfowl;
- C Are toxic to humans, animals, plants or other organisms (toxics standard);
- C Cause the growth of algae or aquatic plants that inhibit or prohibit the habitation, growth, or propagation of other aquatic life or that impair recreational uses (narrative nutrient standard);
- C Cause or contribute to a violation of an aquifer water quality standard prescribed in R18-11-405 or R18-11-406; or
- C Change the color of the surface water from natural background levels of color.

A surface water shall be free from oil, grease, and other pollutants that float as debris, foam, or scum; or that cause a film or iridescent appearance on the surface of the water; or that cause a deposit on a shoreline, bank, or aquatic vegetation. The discharge of lubricating oil or gasoline associated with the normal operation of a recreational water-craft shall not be considered a violation of this narrative standard.

Narrative Aquifer Water Quality Standards

R18-11-405:

- A discharge shall not cause a pollutant to be present in an aquifer classified for a drinking water protected use in a concentration which endangers human health.
- A discharge shall not cause or contribute to a violation of a water quality standard established for a navigable water of the state.
- A discharge shall not cause a pollutant to be present in an aquifer which impairs existing or reasonably foreseeable uses of water in an aquifer.

Arizona's Numeric Aquifer Water Quality Standards

ARIZONA'S GROUND WATER STANDARDS FOR INORGANIC CHEMICALS	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	**AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)**
Antimony (Sb)	6
Arsenic (As)	50
Asbestos	7,000,000 fibers/Liter (longer than 10 µm)
Barium (Ba)	2000
Beryllium (Be)	4
Cadmium (Cd)	5
Chromium (total) (Cr)	100
Cyanide (Cn)	200 (as free cyanide)
Fluoride (F)	4 mg/L
Lead (Pb)	50
Mercury (Hg)	2
Nickel (Ni)	100
Nitrate (NO_3 as N)	10.0 mg/L
Nitrite (NO_2 as N)	1.0 mg/L
Nitrate + Nitrite (as N)	10 mg/L
Selenium (Se)	50
Thallium (Tl)	2

ARIZONA'S GROUND WATER STANDARDS FOR ORGANIC CHEMICALS, PESTICIDES, PETROLEUM HYDROCARBONS, AND POLYCHLORINATED BIPHENYL (PCBs)	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	**AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)**
Alachlor (Lasso)	2
Atrazine (Atranex, Crisazina)	3
Benzene	5
Benzo(a)pyrene	0.2
Carbofuran (Furadan 4F)	40
Carbon tetrachloride (Freon-10)	5
Chlordane	2
2,4-D (Formula 40, Weedar 64) 2,4-Dichlorophenoxyacetic Acid	70
Dalapon or 2.2-Dichloropropionic acid	200
Dibromochloromethane (DBCM or THM)	0.2
Dibromochloropropane (DBCP)	0.2
Dichlorobenzene (DCB)	o-DCB = 600 p-DCB = 75
Dichloroethane (DCA)	1,2-DCA = 5
Dichloroethylene or Dichloroethene (DCE)	1,1-DCE = 7 cis-1,2-DCE = 70 trans-1,2-DCE = 100
Dichloromethane	5
Dichloropropane	1,2-DCP = 5
Di(2-ethylhexyl)adipate (DOA)	400
Di(2-ethylhexyl)phthalate (DOP)	6
Dinoseb 2,4-Dinitro-6-sec-butyl-phenol (DNBP)	7
Dioxin 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.00003
Diquat or Dihydrodipyrido-pyrazidinium salt	20

ARIZONA'S GROUND WATER STANDARDS FOR ORGANIC CHEMICALS, PESTICIDES, PETROLEUM HYDROCARBONS, AND POLYCHLORINATED BIPHENYL (PCBs)

CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)
Endothall or Oxalobicyclo-heptane-dicarbooxylic acid disodium salt	100
Endrin or Hexachloroepoxyoctahydro-endo-dimethanonaphthalene	2
Ethylene dibromide (EDB)	0.05
Ethylbenzene (ETB)	700
Glyphosate or N-(phosphonomethyl)glycine	700
Heptachlor	0.4
Heptachlor epoxide	0.2
Hexachlorobenzene or Perchlorobenzene	1
Hexachlorocyclopentadiene or Perchlorocyclopentadiene	50
Lindane or gamma-Benzene hexachloride	0.2
Methoxychlor (Methoxy DDT, DMDT)	40
Monochlorobenzene, or Chlorobenzene, or Phenyl chloride	100
Oxamyl	200
Perchloroethylene (PCE), Tetrachloroethylene or Tetrachloroethene	5
Pentachlorophenol	1
Picloram	500
Polychlorinated biphenyl (PCB)	0.5
Silvex 2-(2,4,5-Trichlorophenoxy)propionic acid	50
Simazine 2-Chloro-4,6-bis(ethylamino)-2-triazine	4
Styrene	100
1,2,4-Trichlorobenzene	70
Trichloroethane (TCA)	1,1,1-TCA = 200 1,1,2-TCA = 5
Trichloroethylene or Trichloroethene (TCE)	5

ARIZONA'S GROUND WATER STANDARDS FOR ORGANIC CHEMICALS, PESTICIDES, PETROLEUM HYDROCARBONS, AND POLYCHLORINATED BIPHENYL (PCBs)	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	**AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)**
Toluene (TOL)	1000
Toxaphene	3
Vinyl chloride (VC)	2
Xylene (XYL)	10,000

ARIZONA'S GROUND WATER STANDARDS FOR RADIOCHEMICALS, PHYSICAL MEASUREMENTS, AND BACTERIA	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	**AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)**
Beta particle + photon human-caused radionuclides	4 millirem/year
Gross alpha (include Radium-226, exclude radon and uranium)	15 pCi/L
Radium-226 + Radium-228	5 pCi/L
Strontium-90	4 millirem/year 8 pCi/L in bone marrow
Tritium	4 millirem/year 20,000 pCi/L in total body
Total coliform	0 per 100 ml
Turbidity	1 NTU monthly mean, 5 NTU (if 0 fecal coliform after chlorination), 5 NTU (2-day mean)

Surface water and aquifer protection standards are published in Arizona Administrative Code Title 18, Chapter 11 (R18-11-101 through R18-11-506).